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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/801,892	03/08/2001	Colin D. Frank	CE08555R	7192

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EXAMINER	
WARE, CICELY Q	

ART UNIT	PAPER NUMBER
2634	8

DATE MAILED: 05/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/801,892	FRANK, COLIN D.	
	Examiner	Art Unit	
	Cicely Ware	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,10-17 and 23* is/are rejected.

7)☒ Claim(s) *8,9 and 18-22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because

a. Pg. 37, lines 8-9, applicant uses the phrase "as well knowledge of the inter-cell". Examiner suggests using "as well as knowledge of the inter-cell for clarification purposes. Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informalities:

a. Pg. 2, line 28, examiner suggests applicant re-write this line for clarification purposes.

b. Pg. 3, line 25, examiner suggests applicant move line 25 to pg. 4, line 1. Appropriate correction is required.

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention. Claim 1 applicant recites a communication system and a method for antenna beamforming. Claim 1 discloses a method and an apparatus. Applicant does not distinctly specify an apparatus or a method. Examiner suggests applicant distinctively specify an apparatus or a method.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 3, 4, 5, 7, 10, 11, 13, 14, 15, 17 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hogberg et al. (US Patent 6,697,619) in view of Liang et al. (US Patent 6,314,147).

(1) With regard to claim 1, Hogberg et al. discloses a digital beamforming acquisition system a plurality of subscriber units and a transmitting communication device having an antenna array comprised of a plurality of array elements, a method for antenna beamforming and wherein each optimized weighting coefficient of the plurality of optimized weighting coefficients is associated with an element of the plurality of elements and is further associated with a subscriber unit of the plurality of subscriber units (Fig. 2 (14, 21, 22, 40), Fig. 4 (60, 23, 24), Fig. 5 (65, 67, 68, 71, 72), col. 1, lines 61-66, col. 2, lines 8-12, 56-61, col. 3, lines 41-44, col. 5, lines 1-2, 11-21, col. 6, lines 5-32).

However Hogberg et al. does not disclose a step of jointly optimizing a plurality of weighting coefficients to produce a plurality of optimized weighting coefficients.

However Liang et al. discloses a digital receiver comprising a step of jointly optimizing a plurality of weighting coefficients to produce a plurality of optimized weighting coefficients (Fig. 5 (220), col. 1, lines 21-32, col. 3, lines 51-64, col. 4, lines 11-17, col. 11, lines 25-41).

Therefore it would have been obvious to one of ordinary skill in the art to modify Hogberg et al. to incorporate a step of jointly optimizing a plurality of weighting coefficients to produce a plurality of optimized weighting coefficients in order to provide improved estimation of the desired symbols in a received signal that includes the desired symbols, interference and noise (Liang et al., col. 3, lines 28-30).

(2) With regard to claim 3, claim 3 inherits all the limitations of claim 1. Liang et al. further discloses wherein the step of jointly optimizing a plurality of weighting coefficients comprises a step of determining values for the plurality of weighting coefficients that jointly maximize a signal-to-noise ratio for each subscriber unit of the plurality of subscriber units (abstract, col. 2, lines 50-57, col. 3, lines 51-64, col. 4, lines 11-17, col. 11, lines 25-41).

(3) With regard to claim 4, claim 4 inherits all the limitations of claim 1. Liang et al. further discloses wherein the step of jointly optimizing a plurality of weighting coefficients comprises a step of jointly optimizing a plurality of weighting coefficients based on information concerning a plurality of propagation channels and an autocorrelation of background interference and wherein each propagation channel of

the plurality of propagation channels is a propagation channel between a subscriber unit of the plurality of subscriber units and an array element of the plurality of array elements (col. 2, lines 4-11, 22-26, 50-57, col. 3, lines 8-13, 51-64, col. 4, lines 11-17, col. 11, lines 25-41, Fig. 5 (220)).

(4) With regard to claim 5, Liang et al. further discloses approximating one or more terms in a joint optimization expression of a signal-to-noise ratio (SNR) to produce an approximation of the joint optimization expression of an SNR; and independently optimizing a set of weighting coefficients of a plurality of sets of weighting coefficients based on the approximation of the joint optimization expression of an SNR to produce a set of optimized weighting coefficients, wherein each set of optimized weighting coefficients of the plurality of sets of optimized weighting coefficients corresponds to a subscriber unit of the plurality of subscriber units (col. 1, lines 21-32, col. 2, lines 50-60, col. 3, lines 51-64, col. 8, lines 66-67, col. 9, lines 1-5, col. 10, lines 36-44, col. 11, lines 25-41).

(5) With regard to claim 7, claim 7 inherits all the limitations of claim 5. Liang et al. further discloses wherein each subscriber unit of the plurality of subscriber units comprises a Rake receiver, wherein a covariance of an output of the Rake receiver of each subscriber unit comprises a contribution to the covariance by the other subscriber units of the plurality of subscriber units, wherein the step of approximating one or more terms in a joint optimization expression of an SNR comprises a step of approximating the covariance of an output of the Rake receiver of each subscriber unit with a

contribution to the covariance by the other subscriber units (abstract, col. 1, lines 21-32, col. 2, lines 50-60, col. 3, lines 8-13, 51-64, col. 12, lines 37-52, co. 13, lines 1-60).

Liang et al. does not explicitly disclose a rake receiver. However it is well known in the art that a Rake receiver is used interchangeably with a Viterbi equalizer.

(6) With regard to claim 10, claim 10 inherits all the limitations of claim 5. Liang et al. further discloses wherein the communication system further comprises a plurality of communication channels, wherein each communication channel of the plurality of communication channels is allocated to a subscriber unit of the plurality of subscriber units, wherein a power allocated by the transmitting communication device to each communication channel is a reasonable small fraction of the total power transmitted by the communication device, wherein each subscriber unit of the plurality of subscriber units comprises a Rake receiver, wherein a covariance of an output of the Rake receiver of each subscriber unit comprises a contribution to the covariance by the other subscriber units of the plurality of subscriber units, wherein the step of approximating one or more terms in a joint optimization expression of an SNR comprises a step of assuming that the covariance is equal to the contribution to the covariance by the other subscriber units of the plurality of subscriber units (col. 3, lines 20-21, col. 12, lines 37-52, col. 13, lines 1-60).

Liang et al. does not explicitly disclose wherein a power allocated by the transmitting communication device to each communication channel is a reasonable small fraction of the total power transmitted by the communication device. However Liang et al. discloses the cellular network in a TDMA system. Therefore it is well known

in the art that a TDMA system inherently includes eight power levels that differ by increments of 4dB.

(7) With regard to claim 11, claim 11 inherits all the limitations of claim 1. Hogberg et al. further discloses a communication system comprising a plurality of subscriber units, a communication device comprising : an antenna array comprising a plurality of array elements ; a plurality of weighters, wherein each weighter of the plurality of weighters is coupled to an element of the plurality of elements; and a processor coupled to each weighter of the plurality of weighters (Fig. 2 (14, 21, 22), Fig. 5, (65, 68, 67), col. 6, lines 5-33).

(8) With regard to claim 13, claim 13 inherits all the limitations of claims 11 and 3 above. Liang et al. discloses in (Fig. 5 (220)) the processor jointly optimizes a plurality of weighting coefficients by determining values for the plurality of weighting coefficients that jointly maximize a signal-to-noise ratio for each subscriber unit (abstract, col. 2, lines 50-57, col. 3, lines 51-64, col. 4, lines 11-17, col. 11, lines 25-41).

(9) With regard to claim 14, claim 14 inherits all the limitations of claims 11 and 4 above. Liang et al. discloses in (Fig. 5 (220)), the processor jointly optimizes a plurality of weighting coefficients based on information concerning a plurality of propagation channels and an autocorrelation of background interference and wherein each propagation channel of the plurality of propagation channels is a propagation channel between a subscriber unit of the plurality of subscriber units and an array element of the plurality of array elements (col. 2, lines 4-11, 22-26, 50-57, col. 3, lines 8-13, 51-64, col. 4, lines 11-17, col. 11, lines 25-41).

(10) With regard to claim 15, claim 15 inherits all the limitations of claims 11 and 5 above.

(11) With regard to claim 17, claim 17 inherits all the limitations of claims 15 and 17 above.

(12) With regard to claim 23, claim 23 inherits all the limitations of claims 15 and 10 above.

8. Claims 2, 6, 12, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hogberg et al. (US Patent 6,697,619) in combination with Liang et al. (US Patent 6,314,147) as applied to claims 1, 5, 11 and 15 above, and further in view of Dent (US Patent 6,404,821).

(1) With regard to claim 2, claim 2 inherits all the limitations of claim 1 above. Hogberg et al. in combination with Liang et al. disclose all the limitations of claim 1. However Hogberg et al. in combination with Liang et al. do not disclose modulating a plurality of signals to produce a plurality of modulated signals, wherein each signal of the plurality of signals is modulated based on an optimized weighting coefficient of the plurality of optimized weighting coefficients; transmitting each modulated signal of the plurality of modulated signals via an array element of the plurality of array elements.

However Dent discloses a digital beamformer in (Fig. 2) modulating (21, 22, 23) a plurality of signals to produce a plurality of modulated signals, wherein each signal of the plurality of signals is modulated based on an optimized weighting coefficient of the plurality of optimized weighting coefficients; and transmitting each modulated signal of

the plurality of modulated signals via an array element of the plurality of array elements (abstract, col. 3, lines 12-14).

Therefore it would have been obvious to one or ordinary skill in the art to modify the inventions of Hogberg et al. in combination with Liang et al. to incorporate modulating a plurality of signals to produce a plurality of modulated signals, wherein each signal of the plurality of signals is modulated based on an optimized weighting coefficient of the plurality of optimized weighting coefficients; transmitting each modulated signal of the plurality of modulated signals via an array element of the plurality of array elements to spectrally control modulated output signals at a reduced cost per voice channel (Dent, col. 3, lines 9-10).

(2) With regard to claim 6, claim 6 inherits all the limitations of claim 5 and 2. Liang et al. further discloses wherein each optimized weighting coefficient in a set of optimized weighting coefficients corresponds to an array element of the plurality of array elements (col. 1, lines 21-32, col. 2, lines 50-60, col. 3, lines 51-64, col. 8, lines 66-67, col. 9, lines 1-5, col. 10, lines 36-44, col. 11, lines 25-41).

(3) With regard to claim 12, claim 12 inherits all the limitations of claim 11. Hogberg et al. further discloses wherein when the communication device transmits data to a subscriber unit of the plurality of subscriber units, the processor provides to each weighter of the plurality of weighters the weighting coefficient associated with the subscriber unit and with the element coupled to the weighter (Fig. 2 (14), Fig. 4 (23, 24), Fig. 5 (65, 67, 68), col. 6, lines 5-33).

(4) With regard to claim 16, claim 16 inherits all the limitations of claim 15. Hogberg et al. further discloses wherein each optimized weighting coefficient in a set of optimized weighting coefficients corresponds to an array element of the plurality of array elements, wherein when the communication device transmits data to a subscriber unit of the plurality of subscriber units, the processor provides to each weighter of the plurality of weighters an optimized weighting coefficient associated with the subscriber unit and with the element coupled to the weighter, and wherein each weighter then modulates a signal based on the weighting coefficient received from the processor (Fig. 5 (65, 67, 68, 71, 72), col. 6, lines 5-33).

Allowable Subject Matter

9. Claims 8, 9, 18-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. The prior art made record of and not relied upon is considered pertinent to applicant's disclosure:

a. Kober et al. US Patent 6252535 discloses a method and apparatus for acquiring wide-band pseudorandom noise encoded waveforms.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 703-305-8326. The examiner can normally be reached on Monday – Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Cicely Ware
cqw
May 5, 2004

STEPHEN CHIN
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